

CURRICULUM VITAE

MUSA L. AUDU, Ph.D.

ADDRESS:Office:

Department of Biomedical Engineering,  
Case Western Reserve University,  
Cleveland, Ohio, 44106.

EDUCATIONAL BACKGROUND

- 1981 - 1984 Case Western Reserve University, Cleveland, Ohio 44106. U.S.A.  
Ph.D. in Mechanical Engineering. Awarded in January 1985.
- 1978 - 1980 Ahmadu Bello University (A.B.U.), Zaria - Nigeria.  
M.S. in Mechanical Engineering. Awarded in August 1980.
- 1974 - 1977 Ahmadu Bello University, Zaria - Nigeria.  
B.S. in Mechanical Engineering. First Class Honors. Awarded in June 1977.

Awards and Honors:

1. Shell-BP Prize for "Best Final Year Mechanical Engineering Student". A.B.U. Zaria - Nigeria, 1977.
2. Mobil Oil Prize for "Best Final Year Mechanical Engineering Design Project". A. B. U. Zaria - Nigeria, 1977.
3. U. A. C. Prize for "Best All round Student in the Faculty of Engineering". A.B.U. Zaria - Nigeria, 1977.
4. Nigerian Breweries Limited Prize for "Best Final Year Mechanical Engineering Student's Overall Performance over Three Years". A.B.U. Zaria - Nigeria, 1977.
5. Ahmadu Bello University, Zaria - Nigeria, Study Fellowship (January, 1981 to December, 1984). To study for a Ph.D. degree in the United States.
6. Association of Commonwealth Universities Traveling Fellowship (October, 1989 - November, 1989). To understudy some Centers of excellence in engineering schools in the United Kingdom.
7. Commonwealth Association of Polytechnics in Africa, Senior Management Development Workshop (14th - 24th March, 1994). Accra - Ghana.

8. 2012-2013 Outstanding Undergraduate Teaching Award, made by the CWRU Biomedical Engineering Society.

## EMPLOYMENT HISTORY

March, 2012 to date

Research Associate Professor, Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH, USA. Continuing the duties of Principal Researcher.

May, 2000 to February, 2012

1. Principal Researcher, Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH, USA. Developing mathematical/computer models for simulation of human standing posture and balance; being research on NIH/VA-Funded projects on restoration of function to individuals with spinal cord injury through Functional Electrical Stimulation (FES).
2. Teaching assignments at CWRU: EBME/EMAE 402 - Muscles, Biomechanics and Control of Movement (dynamics portion). Also taught EMAE 415 on 'as needed basis'.

April, 1992 – May, 2000

1. Rector (President), The Federal Polytechnic, Bauchi - Nigeria. Responsible for the day-to-day administration of the Polytechnic.
2. I also participate in supervision of Postgraduate students at the Abubakar Tafawa Balewa University (A.T.B.U.) Bauchi - Nigeria.

November 1988 to March, 1992

Associate Professor (Reader) and Director, Center for Industrial Studies, Abubakar Tafawa Balewa University, Bauchi - Nigeria.

1. Day-to-day administration of the Center.
2. Taught the following undergraduate courses: Control Theory, Machine Design, Engineering Mechanics.  
And the following postgraduate courses: Theory of Elasticity, Advanced Dynamics, Theory of Metal Forming, Computers, Optimization and Design, Advanced Engineering Mathematics, Advanced Instrumentation and Industrial Control, Design for Production

August 1978 to October 1988

Graduate Assistant to Senior Lecturer, Department of Mechanical Engineering, A.B.U. Zaria - Nigeria - Duties included:

1. Teaching the following undergraduate courses: Dynamics, Mechanics of Machines, Machine Design, Vibrations Theory, Control Theory.
2. And the following Postgraduate courses: Machine Tool Design, Systems Theory.

## PROFESSIONAL AND COMMUNITY SERVICE

1. Treasurer, Nigerian Journal of Engineering, 1985 - 1988.
2. Member, Governing Council of Bauchi State Polytechnic, 1988-1991.

3. Director, Federal Superphosphate and Fertilizer Company, Kaduna, 1988 - 1992.
4. External Examiner, Federal University of Technology, Yola, 1989 - 1991.
5. External Examiner, The Federal Polytechnic Bauchi, 1990 - 1992.
6. Chairman, Shongom Community Bank, Kaltungo, 1993 - 1998.

#### REVIEWER/EDITOR

1. Member, Editorial Board, Nigerian Journal of Technical Education, 1998 - 2000.
2. Reviewer, Journal of Rehabilitation, Research and Development.
3. Reviewer, IEEE Transactions on Neural Systems & Rehabilitation Engineering.
4. Reviewer, 2005 IEEE International Conference on Robotics and Automation.
5. Reviewer, Journal of Biomechanics.
6. Reviewer, Neuromodulation.
7. Reviewer, Transactions of the ASME, Journal of Biomechanical Engineering.

#### ADMINISTRATIVE DUTIES

1. Coordinator (Head of Department), Mechanical Engineering Programme, A.T.B.U. Bauchi, 1989 - 1990.
2. Director, Centre for Industrial Studies, A.T.B.U. Bauchi, 1988 - 1992.
3. Acting Dean, School of Engineering, A.T.B.U. Bauchi, 1990 - 1992.
4. Rector, The Federal Polytechnic, Bauchi, 1992 to 2000.

#### PROFESSIONAL AFFILIATIONS

1. Member American Society of Biomechanics.
2. Corporate Member, The Nigerian Society of Engineers
3. Registered Engineer with Council for the Regulation of Engineering in Nigeria (COREN)
4. Member IFESS: International FES Society

#### PUBLICATIONS

##### Published Journal Papers

1. **Audu, M. L.** and Davy, D. T., "The Influence of Muscle Model Complexity in Musculoskeletal Motion Studies", Transactions of the ASME, Journal of Bioengineering Vol. 107, No. 2, pp 147 - 157, 1985 (PMID: 3999711).
2. Mansour, J. M. and **Audu, M. L.**, "The Passive Elastic Moment at the Knee and its Influence on Human Gait". Journal of Biomechanics, Vol. 19, No. 5, pp 369 - 373, 1986 (PMID: 3733762).
3. Davy, D. T. and **Audu, M. L.**, "A Dynamic Optimization Technique for Predicting Muscle Forces in the Swing Phase of Gait". Journal of Biomechanics, Vol. 20, No. 2 pp 187 - 201, 1987 (PMID: 3571299).

4. **Audu, M. L.** and Davy D. T. "A Comparison of Optimal Control Algorithms for Complex Bioengineering Problems" *Optimal Control Applications and Methods*, Vol. 9, No.1 pp 101 - 106. 1988.
5. **Audu, M. L.**, "Computer-Aided Kinematic Analysis of Mechanisms". *Nigerian Journal of Engineering* Vol. 5, No.2, pp 175 -185. 1988.
6. **Audu, M. L.**, "Computer-Aided Symbolic Derivation of Equations of Motion for Systems of Rigid Bodies", *Journal of Engineering Research*, Vol. JER-2, No.2, pp. 84 - 101, 1990.
7. Jolaiya, S.O., **Audu, M. L.** and Tuleun, L. T., "The Design of an Attachment for Longitudinal Turning on Single-Spindle Automatic Lathe", *The Nigerian Engineer*, Vol. 27, No. 3, pp. 75 - 83, 1992.
8. **Audu, M. L.**, "Automatic Simplification and Substitution in a Symbolic Manipulation Program", *Technical Transactions of the Nigerian Society of Engineers*, Vol. 29, No. 2, 1994.
9. **Audu, M. L.** and Obi, A.I. "A Pulse Testing Technique for the Structural Identification of the Tool-Post Complex of a Lathe Machine". *Spectrum Journal*, Vol. 2, Nos. 1 and 2, pp. 25 - 36, 1995.
10. **Audu, M. L.**, "An Apparatus for the Study of the Efficiency of Screw Threads", *Nigerian Journal of Technical Education*, Vol. 13, No. 1 and 2, pp. 69 - 77, 1996.
11. **Audu, M. L.**, "Design, Construction and Testing of a Demonstration Twist Drill Dynamometer". *Spectrum Journal*, Vol. 3, Nos. 1 and 2, pp. 43 - 53, 1996.
12. **Audu, M. L.** and Ali, M.D., "Design and Production of Pistons for a Small Engine", *Nigerian Journal of Technical Education*, Vol. 14, No. 2, pp. 1 - 14, 1997.
13. **Audu, M. L.** "An AutoCAD-based program for the insertion of points in a planar domain with applications in the Finite Element Method". *Spectrum Journal*, Vol. 4, Nos. 1 and 2, pp. 45 - 59, 1998.
14. **Audu, M. L.** and Alhaji, A. U., "Design, Construction and Testing of a Manually-operated Pipe Chair Frame Bending Jig", *Polymath Journal*, Vol. 1, No. , pp. 16 - 22, 2000.
15. **Audu, M. L.**, "An Optimal Control Strategy for Determining the Lower Limb Joint Torques required to stand erect from the squatting position". *Nigerian Journal of Technical Education*, vol. 17, Nos. 1 and 2, pp. 10 - 26, 2000.
16. Adisa, A. B. and **Audu, M. L.** "Automatic Renumbering of Finite Element Nodes", *Journal of Engineering Technology and Industrial Applications*. Vol.1 No.1, pp24-39, 2000.
17. **Audu, M.L.**, Kirsch, R. F. and Triolo, R.J., "A Computational Technique for Determining the Ground Reaction Forces in Human Bipedal Stance". *Journal of Applied Biomechanics*, vol. 19, No. 4, pp. 361 – 371, November 2003.
18. Knutson, J, **Audu, M** and Triolo, R, "Interventions for Mobility and Manipulation after Spinal Cord Injury: A Review of Orthotic and Neuroprosthetic Options". In *Topics in Spinal Cord Injury Rehabilitation*, Thomas Land Publication, Birmingham, AL, USA, 2006.
19. Wilkenfeld, A., Triolo, R.J. and **Audu, M.L.**, "Feasibility of Functional Electrical Stimulation for Control of Seated Posture after Spinal Cord Injury: A Simulation Study",

- Journal of Rehabilitation, Research and Development, vol. 43, No. 2, pp. 139 – 152, 2006 (PMID: 16847781).
20. Heilman, B. P., **Audu, M. L.**, Kirsch, R. F. and Triolo, R.J., “Selection of an Optimal Muscle set for a 16-channel Standing Neuroprosthesis using a Human Musculoskeletal Model”, Journal of Rehabilitation, Research and Development, vol. 43, No. 2, pp. 273 – 286, 2006 (PMID: 16847793).
  21. Amankwah, K., Kirsch, R. F. and Triolo, R.J. and **Audu, M.L.**, “A model-based study of passive joint properties on muscle effort during static stance”. Journal of Biomechanics, volume. 39, pp. 2253-2263, 2006 (PMID: 16157347).
  22. **Audu, M.L.**, Kirsch, R. F. and Triolo, R.J., “Experimental Verification and Application of a Computational Technique for determining Ground Reactions in Human Bipedal Stance”. Journal of Biomechanics, vol. 40, 1115 – 1124, 2007 (PMID: 16797023).
  23. To, C. S., Kobetic, R., Schnellenberger, J. R., **Audu, M. L.** and Triolo, R. J., "Design of a variable constraint hip mechanism for a hybrid neuroprosthesis to restore gait after spinal cord injury". IEEE/ASME Transactions on Mechatronics, vol. 13, No. 2, pp. 197-205, April 2008.
  24. Gartman, S., **Audu, M. L.**, Kirsch, R. F. and Triolo, R. J., "Selection Of An Optimal Muscle Set For A 16-Channel Standing Functional Electrical Stimulation System", Journal of Rehabilitation, Research and Development, vol. 45, No. 7, pp. 1007–1018, 2008 (PMID: 19165690).
  25. Kobetic, R., To, C.S., Schnellenberger, J.R., **Audu, M.L.**, Bulea, T.C., Gaudio, R., Pinault, G., Tashman, S. and Triolo, R.J., "Development of hybrid orthosis for standing, walking, and stair climbing after spinal cord injury", Journal of Rehabilitation Research & Development, Vol. 46, No. 3, Pages 447–462, 2009 (PMID: 19675995).
  26. Lambrecht, J. M., **Audu, M. L.**, Triolo, R. J. and Kirsch, R. F. "Musculoskeletal model of trunk and hips for development of seated-posture-control neuroprosthesis", Journal of Rehabilitation, Research and Development, vo. 46, No. 4, Pages 515-528, 2009 (PMID: 19882486).
  27. **Audu, M. L.**, To, C. S., Kobetic, R. and Triolo, R. J., "Gait evaluation of a novel hip constraint orthosis with implication for walking in paraplegia", IEEE Trans. on Neural Systems and Rehab Eng., vol. 18, No. 6, pp. 610-618, 2010 (PMID: 20378478).
  28. Nataraj, R., **Audu, M. L.**, Kirsch, R. F. and Triolo, R. J., “Comprehensive Joint Feedback Control for Standing by Functional Neuromuscular Stimulation—A Simulation Study”, IEEE Trans. on Neural Systems and Rehab Eng., vol. 18, No. 6, pp. 646 - 657, 2010 (PMID: 20923741).
  29. **Audu, M. L.**, Nataraj R., Gartman S.J., and Triolo R.J., “Posture shifting after spinal cord injury using functional neuromuscular stimulation - a computer simulation study.” Journal of Biomechanics, vol. 44, No. 9, pp. 1639-1645, 2011.
  30. To, C.S., Kobetic, R., Bulea, T.C., **Audu, M.L.**, Schnellenberger, J.R., Pinault, G. and Triolo, R.J. “Stance control knee mechanism for lower-limb support in hybrid neuroprosthesis”. Journal of Rehabilitation, Research and Development, vol. 48, No. 7, Pages 839-850, 2011.
  31. Nataraj, R., **Audu, M. L.**, Kirsch, R. F. and Triolo, R. J., “Trunk Acceleration for Neuroprosthetic Control of Standing – a Pilot Study”. Journal of Applied Biomechanics,

- vol. 28, No. 1., pp 85 – 92, 2012.
32. To, C. S., Kobetic, R., Bulea, T. C., **Audu, M. L.**, Schnellenberger, J. R., Pinault, G., Triolo, R. J. “Sensor-Based Stance Control With Orthosis and Functional Neuromuscular Stimulation for Walking After Spinal Cord Injury”, *Journal of Prosthetics & Orthotics*, vol. 24, Issue 3, p 124–132, 2012.
  33. Bulea T.C., Kobetic R., To C.S., **Audu M.L.**, Schnellenberger J., Triolo R.J. “A Variable Impedance Knee Mechanism for Controlled Stance Flexion During Pathological Gait”, *IEEE Transactions on Mechatronics*, vol. 17, no. 5, pp. 822-832, 2012.
  34. Nataraj, R., **Audu, M. L.**, Kirsch, R. F. and Triolo, R. J., “Center of mass acceleration feedback control for standing by functional neuromuscular stimulation: A simulation study”, *Journal of Rehabilitation, Research and Development*, vol. 49, No. 2, Pages 279-296, 2012.
  35. Nataraj, R., **Audu, M. L.** and Triolo, R. J., “Center of mass acceleration feedback control of functional neuromuscular stimulation for standing in presence of internal postural perturbations”, *Journal of Rehabilitation, Research and Development*, vol. 49, No. 6, Pages 889-912, 2012.
  36. Nataraj, R., **Audu, M. L.** and Triolo, R. J., “Comparing joint kinematics and center of mass acceleration as feedback for control of standing balance by functional neuromuscular stimulation”, *Journal of NeuroEngineering and Rehabilitation*, vol. 9:25, Pages 1-11, 2012 (PMID: 22559852).
  37. Bulea, T.C., Kobetic, R., **Audu, M.L.**, Schnellenberger, J.R. and Triolo, R.J., “Finite State Control of a Variable Impedance Hybrid Neuroprosthesis for Locomotion After Paralysis”, *IEEE Trans. on Neural Systems and Rehab Eng.*, vol. 21, No. 1, pp. 141 - 151, 2013.
  38. Nataraj, R., **Audu, M.L.** and Triolo, R.J., “Center of Mass Acceleration Feedback Control of Standing Balance by Functional Neuromuscular Stimulation Against External Postural Perturbations”, *IEEE Transactions on Biomedical Engineering*, vol. 60, No. 1, pp. 10-19, 2013.
  39. Triolo, R.J., Bailey, S.N., Miller, M.E., Lombardo, L.M. and **Audu, M.L.**, "Effects of Stimulating Hip and Trunk Muscles on Seated Stability, Posture, and Reach After Spinal Cord Injury", *Archives of Physical Medicine and Rehabilitation*, vol. 94, pp:1766-1775, 2013.
  40. Triolo, R.J., Bailey, S.N., Lombardo, L.M., Miller, M.E., Foglyano, K. and **Audu, M.L.**, "Effects of Intramuscular Trunk Stimulation on Manual Wheelchair Propulsion Mechanics in 6 Subjects With Spinal Cord Injury", *Archives of Physical Medicine and Rehabilitation*, vol. 94, pp. 1997-2005, 2013.

#### Conference/Seminar Papers/Poster Presentations

1. Mansour, J. M. and Audu, M. L., "Influence of Passive Elastic Joint Moments on Human Gait". Seventh Annual Conference of the American Society of Biomechanics, Mayo Clinic, Rochester, Minnesota. Sept. 28 - 30, 1983.
2. Audu, M. L. and Davy, D. T., "A Comparison of Different Muscle Models in Human Motion Studies". 1984 *Advances in Bioengineering*, ed. R. L. Spilker, pp 135 - 136.

3. Audu, M. L., "Optimization Problems in Human Locomotion Studies", Presented at the National Mathematical Centre, Abuja, Nigeria, Saturday, 13th March, 1999.
4. Audu, M.L., Kirsch, R. F. and Triolo, R.J., "Development of an Artificial Vestibular System for Unassisted Standing in FES", Poster Presented at the Thirty Second Neural Prosthesis Workshop of the National Institutes of Health (NIH), Bethesda, Maryland, October, 2001.
5. Audu, M.L., Kirsch, R. F. and Triolo, R.J., "Estimating the Ground Reaction Forces in Three-Dimensional Simulation of Standing Posture", Presented at the 6<sup>th</sup> Annual Conference of the International FES Society, Cleveland, OH, June, 2001.
6. Audu, M.L., Kirsch, R. F. and Triolo, R.J., "Estimating the Magnitude and Location of the Ground Reaction Forces with Application to three Dimensional Studies of Standing Postures", Poster Presented at the Thirty Third Neural Prosthesis Workshop of the National Institutes of Health (NIH), Bethesda, Maryland, October, 2002.
7. Audu, M.L., Kirsch, R. F. and Triolo, R.J., "Three Dimensional Modeling Of The Lower Extremity For The Study Of Static Standing Postures In Functional Electrical Stimulation (FES)", Presented at the Second Joint meeting of the IEEE EMBS-BMES Conference, Houston, Texas, October, 2002.
8. Triolo, R.J., Davis, J.A., Audu, M.L., Bogie, K., Kirsch, R. F. and Wilkenfeld, A., "Neuroprosthesis for Standing, Walking and Control of Seated Posture", Poster Presented at the Thirty Fourth Neural Prosthesis Workshop of the National Institutes of Health (NIH), Bethesda, Maryland, October, 2003.
9. Hincapie, J.G., Audu, M.L. and Kirsch, R.F., "Adaptive Control Techniques for Upper Extremity Neuroprosthesis", Poster Presented at the Thirty Fourth Neural Prosthesis Workshop of the National Institutes of Health (NIH), Bethesda, Maryland, October, 2003.
10. Heilman, B., Kirsch, R.F., Triolo, R.J., Audu, M.L., and Amankwah, K., "Selection of an Optimal Muscle set for a Standing Neuroprosthesis using Human Musculoskeletal Model", Poster Presented at the Thirty Fourth Neural Prosthesis Workshop of the National Institutes of Health (NIH), Bethesda, Maryland, October, 2003.
11. International Symposium on Technology Education and Training organized by the World Federation of Technology Organizations (27<sup>th</sup> June to 1<sup>st</sup> July, 1998). Cape Town - South Africa.
12. Internet Technology and Education Workshop organized by the Faculty Center for excellence in Teaching, California State University, Hayward, California, U.S.A. (13<sup>th</sup> to 16<sup>th</sup> August, 1998).
13. First World Congress of Colleges and Polytechnics organized by the Association of Canadian Community Colleges, Quebec, Canada (29th May to June 1st, 1999).
14. Audu, M.L., Kirsch, R. F. and Triolo, R.J., "Controller design for hands-free standing of SCI subjects with FES", Poster Presented at the Neural Interfaces Workshop of the National Institutes of Health (NIH), Bethesda, Maryland, November, 2004.
15. Audu, M.L., Kirsch, R. F. and Triolo, R.J., "Design of Controllers for Restoration of Balance in Bipedal Human Standing", Proceedings of the International Symposium on computer Simulation in Biomechanics, Cleveland, Ohio, July, 2005, pp. 7-8.
16. Nataraj, R., Triolo, R.J., Kirsch, R.F., and Audu, M.L., "Controller development for Automatic Standing Balance using Functional Neuromuscular Stimulation following

- Spinal Cord Injury", Proceedings of the International Symposium on computer Simulation in Biomechanics, Cleveland, Ohio, July, 2005, pp. 9-10.
17. Nataraj RN, Audu ML, Kirsch RF, Triolo RJ. "Control System Development for Automatic Standing Balance using Functional Neuromuscular Stimulation (FNS) Following Spinal Cord Injury (SCI)". *American Society of Biomechanics*, August 2007, Stanford University, Palo Alto, CA.
  18. Nataraj RN, Audu ML, Kirsch RF, Triolo RJ. "Automatic Control of Standing Balance Using Functional Electrical Stimulation following Spinal Cord Injury", *12th Annual Conference of the International FES Society*, November 2007, Philadelphia, PA.
  19. Audu, M. L., Nataraj, R., Kirsch, R.F., and Triolo, R.J., "Dynamic Computer Optimization for Standing Balance and Control of Postural Sway after Spinal Cord Injury", *12th Annual Conference of the International FES Society*, November 2007, Philadelphia, PA.
  20. Audu, M.L., Murphy, J.O. and Triolo, R.J., "Design Of Controllers For Seated Balance After Spinal Cord Injury", Military Health System Research Symposium (MHSRS), August, 2012, Ft Lauderdale, FL.
  21. Audu, M.L., Murphy, J.O and Triolo, R.J., "Trunk Stability After Spinal Cord Injury", *17th Annual Meeting of the International Functional Electrical Stimulation Society (IFESS)*, September 9-12, 2012, Banff, Alberta, Canada.
  22. Murphy, J.O., Audu, M.L., Triolo, R.J., "Control of Seated Balance after Spinal Cord Injury using Functional Electrical Stimulation", *Biomedical Engineering Society (BMES) Annual Meeting*, October 24-27, 2012, Atlanta, Georgia, USA.

#### THESIS COMMITTEE MEMBERSHIP

1. Heilman, Benjamin, Degree: M.S., 2003.
2. Amankwah, Kofi, Degree: Ph.D., 2004.
3. Goldstein, Douglas, Degree: M.S., 2004.
4. Lambrecht, Joris, Degree: M.S., 2006.
5. Blana, Dimitra, Degree: Ph.D., 2008
6. Hincapie, Juan Gabriel, Degree: Ph.D., 2008.
7. To, Curtis, Degree: Ph.D., 2010 (non-voting member).
8. Nataraj, Ravi, Degree: Ph.D., 2011
9. Bulea, Thomas, Degree: Ph.D. 2012
10. Polinkovsky, Arkady , Degree MS (EMAE) 2010.
11. Kerne, Nicole, Degree: Ph.D. (EMAE) 2012
12. Murphy, Julie, Degree: Ph.D. Current
13. Chang, Sarah, Degree: Ph.D. Current

#### THESES SUPERVISION

##### (a) Postgraduate (Doctorate)

1. Mohammed, H.M., Modeling the Force-Wear Relationship with Application in Tool-Condition Monitoring in Milling Operations, Ph.D. (Mech), A.T.B.U.



Bauchi, September, 1998.

(b) Postgraduate (Masters)

1. Jolaiya, S. O., Design and Construction of a Longitudinal Turning Attachment for Use on a Single Spindle Automatic Lathe. Dept. of Mech. Eng., A.B.U. Zaria, M.Sc (Prod. Eng.), 1987.
2. Obi, A I., A Study of regenerative Chatter in Machine Tools. Dept. of Mech. Eng., A. B. U. Zaria, M.Sc (Prod. Eng.), 1988.
3. Dauda, S., Development of a Computer Package for the Kinematic Analysis of Complex Mechanisms. Mech. Eng. Programme, A.T.B.U. Bauchi, M.Eng. (Mech.), 1991.
4. Bello, A., A Computer Program for the Re-Numbering of Nodes and Elements of a Finite Element Mesh, A.T.B.U. Bauchi, M.Eng., 1994.
5. Julie M., Case Western Reserve University, Ph.D., Current.

CURRENT FUNDING**SC090230** (PI: Audu)

10/10 – 9/13

6.0 calendar months/yr

“Control of a Seated Balance with Functional Neuromuscular Stimulation (FNS)”

The purpose of this project is to characterize the posture and balance control mechanisms of the human spine and trunk during sitting and develop strategies to improve postural stability of the pelvis and torso in individuals with spinal cord injuries.

Overlap: NONE

**R01NS040547-08** (PI's: Triolo/Audu)

07/11 – 07/16

6.0 calendar months/yr

“Automatic Control of Standing Balance with FNS”

The overall goal of the proposed research is to develop new control systems to restore standing function and enhance the postural stability of individuals paralyzed by spinal cord injuries (SCI). Systems that provide persons with the ability to stand, alter their standing posture, and maintain balance by automatically adjusting stimulation to the paralyzed muscles will be designed, optimized in simulation, and evaluated experimentally in six volunteers with SCI. The project will result in a unique, comprehensive balance control system that extends the capabilities and improves the safety of all currently available standing neuroprostheses.

Overlap: NONE